REMARKS

Claims 1-37 are pending in the present application. Claims 1 and 8 are independent claims.

ISSUE REGARDING U.S. PATENT 5,617,687

Applicant notes that U.S. Patent 5,617,687 to Bussey, Jr. et al. was included with the Office Action of May 6, 2003. However, Applicant does not believe that this reference has been cited on the PTO-892 form. Applicant hereby requests the Examiner to clarify the status of the above-identified patent with respect to the present application.

35 U.S.C. § 103KORSGAARD/KUNZEL REJECTION

Claims 1-37 have been rejected under 35 U.S.c. § 103(a) as being unpatentable over WO 85/00188 to Koresgaard in view of WO 96/33321 to Kunzel. This rejection, insofar as it pertains to the presently pending claims, is respectfully traversed for the following reasons.

Kunzel discloses a vapour barrier having a water vapour diffusion resistance depending on the relative humidity. The material for the vapour barrier is a foil or a coating on a carrier material (PTO translation, page 4, lines 11-12). Examples of foils are mentioned as polyamide 6, polyamide 4 and polyamide 3. These polyamides are employed as foils and inherently exhibits the required characteristics with regard the water vapour diffusion resistance. Moreover, they have the stability which is required in buildings, so that they can be employed without any required additional expenditure (PTO translation, page 5, line 8-15).

However, other materials which exhibit insufficient stability and can be deposited on appropriate carrier materials may also be employed. In this context, the carrier materials

preferably exhibit a low water vapour diffusion resistance and the required characteristics of the vapour barrier in accordance with the invention are essentially effected by the coating (PTO translation, page 5, line 19 - page 6, line 2).

The materials may also be present as a coating on a carrier material. In this context, the coating material may be present on one side of the carrier material, but in special cases, it may be also be held in a sandwich-like manner between two layers of carrier material. In the latter case, the coating material may be effectively protected against mechanical attacks from both sides and can, therefore, guarantee the desired water vapour diffusion resistance over a long period of time (PTO translation, page 6, lines 7-13).

Applicant asserts that it should be clear from the above, that the only reason for joining the variable rate layer of Kunzel to other layers is to assure an effective protection of the variable rate layer in the form of a coating and to assure sufficient stability of the variable rate layer in the form of a coating. Thus, there is no other expectation of success as suggested by the Examiner.

The vapour barrier of Kunzel has a water vapour diffusion resistance less than 1 m during summer i.e. when the relative humidity is between 60% and 80% (PTO translation, page 4, lines 17-19). It is clear to a person skilled in the art that the moisture will easily diffuse through the vapour barrier from the inside of the building to the roof/wall structure due to the low resistance of the barrier. This will cause moisture damages to the roof/wall structure. If the building is cooled e.g. during the summer, the problem of moisture damages will be even worse, since the temperature in the building will be low simultaneous with the relative humidity being high, whereby the vapour pressure outwardly is higher.

Furthermore, the barrier of Kunzel is water tight, which means that free water which have leaked into the cavities of the roof or wall structure is collected therein and can only very slowly

diffuse or condense in the summer through the vapour barrier after having been vaporized. Thereby moisture damages will occur to the roof/wall structure. Lastly, Kunzel provides no teaching of a barrier having different characteristics when seen from different sides i.e. there is no up and down of the vapour barrier of Kunzel.

Korsgaard discloses a vapour barrier comprising two water tight layers and a water absorbing layer interposed there between. The water tight layers are provided with openings being arranged in displaced positions relative to each other (claim 1). There is no teaching of a barrier having different characteristics when seen from different sides i.e. there is no up and down of the vapour barrier of Korsgaard.

Furthermore, there is no teaching of barriers having water vapour diffusion resistance depending on the relative humidity. The barrier of Korsgaard offers a sufficiently high resistance to diffusion of water vapour form the one side of the vapour barrier towards the other to prevent an unacceptably high accumulation of moisture on the other side of the vapour barrier, and which enables condensed water formed on the other side of the vapour barrier to move in the opposite direction and to be evaporated from the first named side (page 2, lines 25-31).

The vapour barrier structure according to Korsgaard allows vapour to dry out through the barrier via condensation and by capillary action, and the vapour diffusion resistance is dependent on the character of the intermediate layer of water absorbing material and on the minimum spacings of adjacent openings in the opposite vapour impervious layers. This known water vapour barrier also allows free water accumulated within cavities of a roof or wall structure to be drained through the vapour barrier by capillary action. However, when this known laminated water vapour barrier is used, vaporized moisture may dry out from the roof or wall structure through the vapour barrier via condensation and capillary action into an inner room of the

building only when the relative humidity and the temperature difference between the roof or wall structure and the vapour barrier is such that vapour is condensed on the intermediate layer of water absorbing material which is exposed at the openings defined in the outer layer. This means that the roof or wall structure may dry out only when there is a sufficient fall of temperature in the roof or wall structure, such that the temperature outside is higher than the temperature in the room or inner space of the building.

As a consequence the vapour barrier according to Korsgaard only functions optimally when used in roof or wall structures being positioned towards the sun. Roof or wall structures facing North or with permanent shadow - partly or fully - will not be sufficiently dried out due to lack of temperature fall in the roof or wall structure.

It would not be obvious to combine the teaching of Korsgaard and Kunzel and there exists no motivation for combining the features of the above-mentioned prior art documents. However, even if the skilled person would consider the combination of features of Korsgaard and Kunzel - as proposed by the Examiner - he/she would not arrive at the claimed invention. A combination of the features of Korsgaard in view of Kunzel would result in a water tight water vapour barrier comprising two layers of a vapour pervious material having a water vapour transmission varying with the relative humidity and a water absorbing layer interposed there between, i.e. the two water tight layers of Korsgaard would be replaced with the water tight layer of Kunzel having a water vapour diffusion resistance depending on the relative humidity. This barrier would have the same characteristics when seen from different sides i.e. there is no up and down of the vapour barrier.

Furthermore, this combination would have a low water vapour diffusion resistance during summer, whereby the moisture would diffuse through the vapour barrier from the inside of the

building to the roof/wall structure due to the low resistance of the barrier causing moisture damages to the roof/wall structure.

Furthermore, the combination would be water tight, which means that free water which has leaked into the cavities of the roof or wall structure is collected therein and can only very slowly diffuse or condense in the summer through the vapour barrier after having been vaporized. Thereby moisture damages will occur to the roof/wall structure.

Independent claim 1 of the present invention discloses a water vapour barrier comprising a first water impervious membrane having a plurality of openings and a second water impervious membrane, wherein at least part of the second water impervious membrane comprises a material having a water vapour diffusion resistance, which varies with the relative humidity of the air in contact therewith. It is thereby clear that that vapour barrier according to claim 1 has different characteristics when seen from different sides.

The moisture within the building will during the summer, e.g. when the relative humidity is between 60% and 80% only slowly diffuse through the vapour barrier from the inside of the building to the roof/wall structure due to the first water impervious layer having a relatively high water vapour diffusion resistance, e.g. as defined in claim 9 a water vapour diffusion resistance of at least 10 m. Thereby the barrier according to the present invention provides an efficient protection against moisture damages of the roof/wall structure.

At least a part of the second membrane may have a water vapour diffusion resistance which varies with the relative humidity. As defined in claim 14, the water vapour diffusion resistance of the second membrane is equivalent to at least 2 m air column at a relative humidity of 20-50% and less than 1 m air column at a relative humidity of 60-100% of air in contact with the membrane. The varying water vapour diffusion resistance ensures that when the water

absorbing material is moist or the air within the water absorbing material has a high relative humidity the resistance against moisture diffusion from the water absorbing material through the second membrane and into the inner space or room of the building is low. Consequently, moisture may be removed from the cavities or spaces in the roof or wall structure relatively quickly. However, during the winter when the relative humidity on the side of the vapour barrier facing outwardly is lower than the relative humidity of the air inside the building, the resistance against diffusion of water vapour from the inner space or room of the building into the roof or wall structure is relatively high.

Furthermore, the combination of features of claim 1 results in the advantage that a more rectified transport of vapour or water in the vapour barrier is obtained due to the different characteristics of the barrier when seen from different sides. When the relative humidity is high in the building e.g. during the summer, the moisture in the building will only influence the active foil (the part of the second membrane having a water vapour diffusion resistance varying with the relative humidity) through the openings in the first water impervious membrane which ensures that only a limited amount of moisture will be able to move from the inside to the outside of the water vapour barrier. However, moisture in the roof or the wall structure will influence the active foil at its total area, thereby ensuring that moisture may be removed relatively quickly from the roof or wall structure. The active foil may be influenced only by room moisture through the opening in the first membrane and the active foil influenced by construction moisture at its total area results in the water vapour barrier being very vapour tight during the summer, but vapour open during the winter.

In conclusion, Applicant asserts it would certainly not be obvious to arrive at the invention as defined in independent claim 1. Further, the present inventor has realized that the

combination of features of claim 1 results in the advantage that moisture may be removed from a roof or wall structure or another similar building structure not only by draining of free water and by removing condensed water vapour by capillary action like the known vapour barrier, but also by diffusion. This means that the vapour barrier according to the invention is efficient in drying cavities or spaces in building structures, which may partly or totally be filled with insulating material, than any of the known vapour barriers.

CONCLUSION

Accordingly, in view of the above amendments and remarks, reconsideration of the objections and rejections and allowance of each of claims 1-37 in connection with the present application is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John A. Castellano at the telephone number of the undersigned below in order to schedule a personal interview.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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